

# Ash and Martock Nature - Phosphate Survey

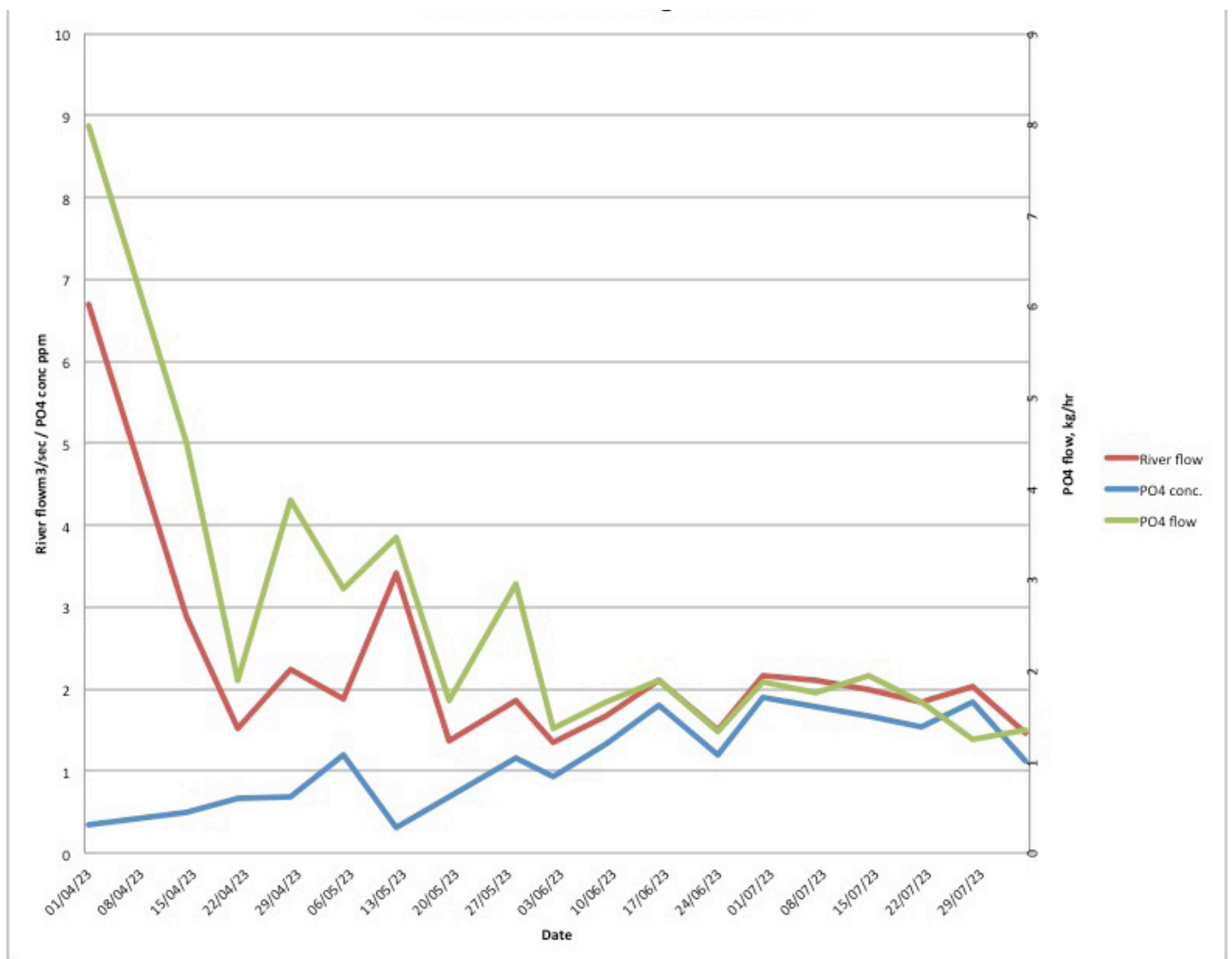
## Report 7

### Parrett Flow, August 2023

The Environment Agency flow rate station on the Parrett is at Chiselborough where the river flows under the A 356 at Byme Bridge. This offers an opportunity to measure the phosphate flow rate down this section of the river. This report examines weekly (Friday morning) measurements at Chiselborough from March to August 2023. The activity was initially triggered by observations in the Parrett and Yeo that showed a surprisingly constant phosphate concentration in these rivers at periods even when their flow rate varied by 10 to 50 times during flooding.

The graph below shows the river flow rate, the phosphate concentration, and the phosphate load over the five months from March to August 2023. This data collection is ongoing.

The Parrett flow is recorded by the Environment Agency every 15 minutes and is online (<http://environment.data.gov.uk/hydrology/explore>) and also at the Centre for Ecology and Hydrology (CEH) (<https://eip.ceh.ac.uk/hydrology/water-resources/>). The latter also shows how flow varies over time.



## Observations

- 1 The phosphate concentration shows a relatively small variation—about 0.5 and 1.8 mg/l- between winter and summer. This is typical for most of the Parrett and Yeo. Summer 2022 was exceptional with a drought spike over 3mg/l (units are  $\text{PO}_4$ , not P)
- 2 Over the same period the river flow showed a much greater variation between 1.5 and 9  $\text{m}^3/\text{s}$ . Occasional measurements made during the 2022/3 winter showed a considerably larger variation.
- 3 Variation in phosphate flow (load) followed the considerable variation in river flow rather than the relatively constant phosphate concentration. When it rains, phosphate flow down the river increases considerably. Where does it come from?
- 4 The phosphate flow graph suggests a baseline flow of around 1.5 kg/hr (ca 40 kg/day) which Report 6 suggests comes almost entirely from sewage outflows at periods when the outflow is mainly from domestic water use and not rainfall. As this is likely to be fairly constant, any flow in excess of this is likely to come from other sources; either agriculture or legacy phosphate in the sediments.
- 5 Tributary measurements at this period (Report 5) showed that the greater part of excess phosphate at times of spate does not come from run-off but most likely from disturbed sediment in the rivers themselves.
- 6 The peak in water flow recorded around 13th May is of interest. This reflected a spring storm in which the flow rates in all local rivers were around 20x normal. This meant that over about two days the catchment delivered possibly delivered around two months worth of phosphate into Bridgewater Bay (see CEH data in the link above). This is discussed further in an annex below.

## Annex. What happened to the phosphate flow in early May 2023?

On 9th May the catchment experienced a significant storm falling on already saturated ground. This created a peak flow rate at Chiselborough of 11  $\text{m}^3/\text{s}$  compared with the normal 0.5 $\text{m}^3/\text{s}$ . The flow of the Yeo at Yeovil on that day was 21.7  $\text{m}^3/\text{s}$  compared with the normal around 1  $\text{m}^3/\text{s}$

No phosphate readings were taken at Chiselborough on 9th May but samples were taken from the Yeo, together with the catchwater and drains, at Huish Episcopi Pumping Station at the downstream end of Wetmoor. The Parrett and Yeo over this period were at almost maximum flow which resulted in a degree of surface flooding by overloaded drains which were not pumped into the already full river. All these watercourses returned unusually high phosphate concentrations on that day; all were in spate and samples contained suspended sediment.

Routine repeat sampling at Huish four weeks later (7 June) showed, by contrast, unusually low phosphate concentrations in both the drains and catchwater as well as the Yeo. The river and drain water levels were normal at this time.

**This pattern deserves a deeper study**, suggesting, as it does, that flash flooding may be a significant natural mechanism for purging the phosphate from the river and drain sediments. It is possible that from the 7th to the 12th May, the phosphate delivered to Bridgewater Bay from the catchment could have been the equivalent of several months of normal flow.